

OPENING ADDRESS

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"Of all occupations from which gain is secured, there is none better than agriculture; nothing more productive, nothing sweeter, nothing more worthy of a free man". These were the wise words of Cicero in days of yore. Whether he also had irrigation farming in mind with all the intricacies involved, will never be known. Today, however, irrigation is part and parcel of modern-day agriculture and it seems to be only appropriate to have a symposium with the theme: Irrigation research and development in southern Africa: past progress, present standing and future challenges.

All our attention is directed to the future. The past is history from which important lessons can be learnt. From the 66 papers and 28 poster papers to be presented over the next 3 days, we will hear of such lessons, of current affairs and of future needs and expectations. I honestly believe that at the end of the day we will agree with Shakespeare that "strong reasons make strong actions" and perhaps a move towards a well-defined irrigation strategy for southern Africa will result from this symposium.

Irrigation is defined as the artificial application of water to soil for the benefit of growing crops. Only when we analyse this definition, do we realise how comprehensive this single word is. Irrigation represents a highly complex practice involving the all-important soil-plant-water-atmosphere continuum. Furthermore, irrigation relies on sound engineering and economic principles which include important technological and sociological considerations. Finally, the manager - the farmer - is the key factor influencing the success or otherwise of an irrigation project. With the march of time it has become clear that three factors, namely *water*, *soil* and *human* resources are of vital concern to the future success of irrigation development in southern Africa.

We are honoured to have representatives from 7 different countries. A special word of welcome to Mr John Hennessy, president of the International Commission on Irrigation and Drainage. To all our visitors from abroad I wish to say that I trust that the rest of your stay in South Africa will be most enjoyable and rewarding and that you will not find us lacking in hospitality. May this visit be the forerunner of many more to come. We hope to lean strongly on your expertise to help us overcome problems like soil sodicity and waterlogging already encountered on 10% of our irrigated areas, and to promote water use efficiency. I am also convinced that your horizons will be broadened by what you see and hear of our experience in irrigation development.

In presenting data for southern Africa I specifically

refer to the Republic of South Africa, the six self-governing states Lebowa, Kwazulu, Gazankulu, Kangwane, Kwandebele and QwaQwa and the Republics of Transkei, Bophuthatswana, Venda and Ciskei, collectively known as the Economic Community of Southern Africa or *Ecosa*. The *Ecosa* region covers about 122 million hectares or 4% of the African continent with an estimated population of 37 million or some 5% of the total population.

The region shares boundaries with neighbouring countries and as river systems and associated catchments generally disregard political boundaries, close co-operation and mutual support between all countries involved are essential. Far greater attention will need to be given to expanding current co-operative actions to ensure, above all, equitable distribution of water supplies and the protection of the water and soil resources for the benefit of all. It augurs well for the future that so many scientists and interested persons from all parts of southern Africa have gathered at this symposium to discuss important issues concerning irrigation.

You will agree with me that there is need for vertical expansion of agricultural production in southern Africa and that irrigation can make an important contribution towards achieving this. But irrigation farming, important as it may be, can maintain its rightful place in the economy of a country only when it is based on sound economic principles. When these principles are employed to utilise resources, it results in a significant contribution to national welfare, higher standards of living and general progress. It is, however, evident from experimental data that even top farmers can still improve on production by employing improved irrigation management. In this regard experts like you will have to decide whether your methods of technology transfer are effective and whether your experimental results can indeed be duplicated on the farm.

A review of natural resources and land utilisation of the *Ecosa* region reveals several important features. The region is characterised by great diversity and has limited potential for intensive agriculture. Arable land is restricted to between 11 and 15% within the region and water supplies are limited and already over-taxed in some catchments. The region also faces the consequences of an exponential population growth which will require a major effort in environmental management.

Deteriorating water quality resulting from urbanisation, industrialisation and other developments is, for instance, a matter of much concern to agri-

culture, especially in terms of the adverse impacts on valuable and scarce land suitable for irrigation. Deterioration of water quality through mineralisation, salinisation and pollution is regarded as a particularly important problem. With water a critical resource in southern Africa, every effort is needed to use supplies efficiently and to retain quality at the highest possible level.

Southern Africa's agricultural production is associated with several serious limitations. For instance, an estimated 65% of the *Ecosia* region receives rainfall of less than 500 millimetres per annum. There is also considerable variation in the intensity and distribution of rainfall. The vulnerability of agriculture with its important role in the national economy, as a result of its dependence on nature, is very evident. Periodic droughts cause catastrophic losses to agriculture in all parts of the region. Carefully planned and well-managed irrigation projects can be the major component in stabilising agricultural production even though this intensive enterprise is also seriously affected by severe droughts. Today, irrigation farming accounts for about 30% of the total crop production of the *Ecosia* region.

In the Republic of South Africa irrigated crop and pasture production are practised on close to 1 million of the 4 million hectare of high-potential arable land. Of this area 78% is permanently irrigated, 13% receives supplementary irrigation and 9% irrigated occasionally. The dominant method of irrigation is by sprinkler which accounts for 55%, followed by flood (33%) and micro-irrigation (12%). Irrigation farming meets the local demand for irrigation production and also provides for the export market.

Agriculture in South Africa is by far the largest user of available water and consumes some 50% of the total. Demands by other sectors such as industry, power generation and domestic uses will no doubt increase, but irrigation is likely to remain the major consumer for the foreseeable future. Domestic use and industry, as primary consumers, are of course favoured during times of shortage. Even under normal conditions, their expected demand for water will increase from 20% in 1990 to 27% in the year 2010. It must be borne in mind that in economic terms the yield achieved by agriculture per unit water does not compare favourably with that of industry. It is also alarming that up to 20% of the water used in irrigation systems at farm level, never reaches its destiny and that 10 to 15% of the water is wasted because of over-irrigation. Maximum crop yield per unit of water should therefore be the target. For this reason it is imperative that a symposium of this nature should strive to enhance water use efficiency, especially at

farm level. The exploitation of scarce water and the energy required to deliver it, is important to every designer and irrigator.

To the best of my knowledge, the first ever irrigation congress in this country was held in 1909. It is therefore appropriate to again take stock of where irrigation science and technology currently stand and to assess outstanding research and development requirements in the light of the ever-increasing demands for limited water resources in a rapidly changing southern Africa.

A southern African irrigation strategy is necessary and it should be a united effort as the subcontinent has a very limited irrigation potential and an ever-increasing population to feed. I doubt that any of you do not believe in co-operation, but if you don't, consider what happens to a wagon that loses a wheel. Equally important, all involved with irrigation research, development and technology transfer should be committed to the highest possible standard of scientific excellence.

This symposium was organised by the South African Irrigation Institute in collaboration with the South African Society of Crop Production, the South African Institute of Agricultural Engineers, the Soil Science Society of South Africa, the Agricultural Economic Association of Southern Africa and the Water Research Commission. This reflects to what extent irrigation has a bearing on various other disciplines and that the solving of problems and the development of new techniques and systems needs a co-ordinated approach by all the parties involved.

We know that there still are many problems to be solved and much development that has to take place in the field of irrigation. Along with the technical there are also the policy aspects in terms of politics, socio-economics, conservation and other national aims that need to be addressed. Moreover there is the important aspect of technology transfer and specialist extension services to promote efficient irrigation that warrants particular attention. I am sure that this symposium will contribute much to clear the way along which irrigation will have to develop to meet the pressing current needs and those of the future for the benefit of the whole of southern Africa.

In conclusion I would like to thank the organisers of this symposium and again compliment them on a task well done. Many thanks also go to the various sponsors who have generously supported the venture. A special word of thanks goes to those who will chair the different sessions, and to those who are committed to formal presentations. My very best wishes to each and everyone of you for a most successful symposium.